

10/533321

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
19 August 2004 (19.08.2004)

PCT

(10) International Publication Number
WO 2004/070895 A3

(51) International Patent Classification⁷: H01S 3/11

(21) International Application Number:
PCT/US2004/002478

(22) International Filing Date: 29 January 2004 (29.01.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/444,541 3 February 2003 (03.02.2003) US

(71) Applicant (for all designated States except US): BAE
SYSTEMS INFORMATION AND ELECTRONIC
SYSTEMS INTEGRATION INC. [US/US]; 65 Spit
Brook Road, NHQ01-719, Nashua, NH 03061 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): POMERANZ,
Leonard, A. [US/US]; 9 Deer Run Road, Hollis, NH
03049 (US).

(74) Agent: LONG, Daniel, J.; Bae Systems Information and
Electronic Systems Integration Inc., 65 Spit Brook Road,
NHQ01-719, Nashua, NH 03061 (US).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), Euro-
pean (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR,
GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
ML, MR, NE, SN, TD, TG).

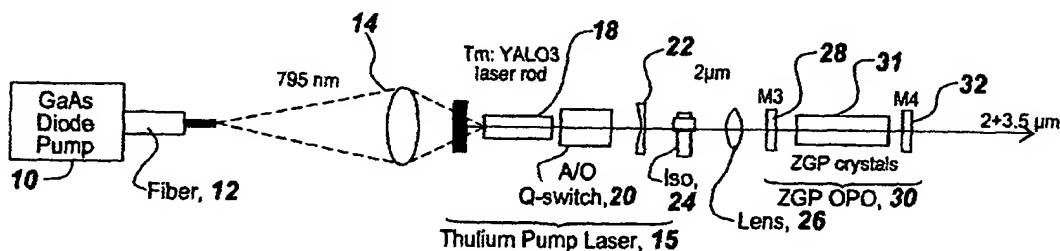
Published:

- with international search report
- before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments

(88) Date of publication of the international search report:
3 March 2005

For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: THULIUM LASER PUMPED MID-IR SOURCE WITH BROADBAND OUTPUT



(57) Abstract: A Thulium laser (15) is used to directly drive a ZnGeP₂ optical parametric oscillator (30) with a nominal 2 μm output to generate the 3-5 micron wavelengths. In one embodiment, the ZGP OPO is configured as a linear resonator and in another embodiment the ZGP OPO is configured as a ring resonator. The ring resonator prevents optical feedback to the Thulium laser (15) and eliminates the need for an optical isolator (24). Moreover, the Thulium laser pump (15) is implemented as a Tm:YAIO₃ laser repetitively Q-switched at 10 kHz is used to drive a ZnGeP₂ OPO. The system is run with room temperature components and achieves over 3 W at 3-5 microns with an efficiency of 5% starting from the pump diode. A two crystal resonator (40, 42) design allows tuning over multiple spectral peaks or alternately as an ultra broad spectral source.

WO 2004/070895 A3